Title	PRIVATE DEPOSITS AND THEIR DETERMINATION POLICY IMPLICATIONS IN GREECE
Sub Title	
Author	DALAMAGAS, BASIL A.
Publisher	Keio Economic Society, Keio University
Publication year	1985
Jtitle	Keio economic studies Vol.22, No.2 (1985.) ,p.73- 95
JaLC DOI	
Abstract	This paper examines the factors that determine private deposits in Greece in the context of an econometric model which includes three interdependent relationships (deposits, prices and wages). The objective is to obtain evidence in order to evaluate whether and to what extent the economic policy measures can affect the size and the time path of deposits. The empirical results indicate significant differences in savers' decisions, as a result of employing alternative hypotheses for interpreting consumers' behaviour. However, this research adds support to the argument that the most important determinants of deposits are disposable income, labour share and the price level.
Notes	
Genre	Journal Article
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=AA00260492-19850002-0073

PRIVATE DEPOSITS AND THEIR DETERMINATION POLICY IMPLICATIONS IN GREECE

BASIL A. DALAMAGAS

Abstract. This paper examines the factors that determine private deposits in Greece in the context of an econometric model which includes three interdependent relationships (deposits, prices and wages). The objective is to obtain evidence in order to evaluate whether and to what extent the economic policy measures can affect the size and the time path of deposits. The empirical results indicate significant differences in savers' decisions, as a result of employing alternative hypotheses for interpreting consumers' behaviour. However, this research adds support to the argument that the most important determinants of deposits are disposable income, labour share and the price level.

I. INTRODUCTION

This paper contains an empirical analysis of the factors determining bank deposits in Greece. The relationship between deposits and its determinants is modelled in various ways, with reference to theories of consumer behaviour, portfolio balance considerations and more ad-hoc empirically based arguments.

The major contribution of the paper is the empirical finding of the significant effects of economic policy measures on deposits that have eluded previous investigators. These results can be attributed to three innovations incorporated in this study: (i) the use of the opportunity cost of savings as an exogenous variable in the deposits function; (ii) the endogeneity of the price equation in view of the overwhelming importance attached to the inflation-saving linkage by earlier studies[1]; and (iii) the endogeneity of the wage equation in order to account for the allegedly major contribution of the labor cost to the high rates of inflation of the 1970s.

Interest in saving behavior has revived by the recent volatility of personal saving. Most of the work in this area is directed towards the behavioral interpretation of the inflation-saving linkage,[2] in an attempt to explain the surprisingly high saving rate through the first half of the 1970s. These studies made it clear by the mid-1970s that the high inflation rates were the main determinant of the high personal saving rates, despite the prevailing uncertainty about the exact underlying mechanism. However, the personal saving rate has described a

[1] For a brief discussion of those studies, see Peek (1983).

[2] See, for example, Poole (1982), Deaton (1977), Boskin (1978), Juster and Lester (1975), Juster and Wachtel (1972), Wachtel (1977).

declining track since 1976, even though the inflation rate rose from its 1976 level. Given that both the low personal saving rates at the end of the decade and the earlier high saving rates have been accompanied by high rates of inflation, explanations that stress the relationship between inflation and saving remained in doubt.

As regards the opportunity cost, empirical studies have generally tended to exclude it, although a number of theories of saving recognize a role for capital gains.[3] The few empirical studies that have explicitly considered capital gains effects either include direct measures of capital gains [Feldstein (1973)] or attempt to proxy capital gains effects indirectly, by including corporate retained earnings in the income measure [Boskin (1978)], by using changes in an index of share prices [Brumberg (1956)] and so on.

In contrast to what one might have expected, the empirical studies that have incorporated direct capital gains measures have found little support for significant effects on saving [see, however, Peek (1983)] as a result of using flawed measures of net capital gains, improperly specified equations etc.

Private deposits constitute one of the alternatives for private saving and compete with investment in real estate or securities. Therefore, as deposits represent a portion of saving, they are affected not only by the general factors which determine private saving —and, in a broader sense, the consumption pattern of individuals— but also by special factors which determine the preference of savers for this type of saving.

It should be stressed from the outset that the purpose of the paper is not to study portfolio behaviour in the non-bank private sector, in which case one would have expected us to develop a portfolio model comprising the most important assets and to estimate the demand system implied by such a model. Instead, we intend to analyse empirically the determinants of behaviour of bank deposits over time. To this end, deposits with financial institutions is chosen as the dependent variable of the entire analysis rather than a savings measure from the national accounts.

The plan of the paper, in which no novel theoretical developments are carried out, is as follows: the deposits function in the context of the absolute and the permanent income hypotheses is specified in Section II. The empirical application of the relative income hypothesis did not yield any reliable results and was therefore excluded. In Section III, the price function and the wage equation are estimated in order to evaluate the effectiveness of stabilization and incomes-policy measures. The response of deposits to price changes, incomes policy measures and the other determinants is quantified in Section IV by solving the simultaneous system of (deposits, price and wage) equations. Section V contains a summary of the analysis and some concluding remarks.

[3] See Keynes (1936); Friedman (1957). Empirical investigations based on the life cycle hypothesis [Modigliani and Brumberg (1955), Ando and Modigliani (1963)] implicitly include past net capital gains, since wealth consists of past accrued capital gains, saving and beginning lifetime wealth.

Annual data were used to estimate the parameters of the model. Estimates are based on the sample period 1949–1983 (see appendix for an explanation of the data and sources).

II. THE DEPOSITS FUNCTION

The econometric analysis of the deposits function will include new deposits accruing each year (saving), as well as the accumulated or aggregate deposits (savings). For methodological purposes, the terms deposits and saving (savings) are used alternatively in the text and imply the same thing, i.e. private deposits with commercial banks[4] and specialized credit institutions, unless otherwise stated.

The behavior of new deposits (saving) is examined within the framework of the absolute income hypothesis, which assumes away wealth effects. On the other hand, the behavior of aggregate deposits (savings) is examined in the context of the permanent income hypothesis, according to which savings are supposedly affected by wealth through permanent disposable income.[5] The different treatment of the wealth variable in the two forms of deposits does not agree with Tobin's views (1951), but it seems to be more suitable because the saving function correlates flows (saving and current income), whereas the savings function correlates stocks (accumulated savings and wealth).

Current income is expected to exert a positive influence on deposits, whilst wealth a negative one [see Klein (1951), Hamburger (1955)]. The effect of interest rate cannot be determined a priori. Its increase affects households' choice between present and future consumption in favour of future consumption. Empirical results, however, provide supporting evidence for the opposite argument, possibly because of the presence of target savers [Musgrave (1959)]. Nor can the effects of income distribution on deposits be determined a priori. The Keynesian view,

[4] If the present analysis is to have any practical importance, the ratio of bank deposits to the sum of financial assets should be large enough. In fact, this ratio ranges from 0.71 in 1952 to 0.86 in 1982. Ratios of other financial items to the total are much lower. For example, the ratio of currency in circulation to total financial assets ranges from 0.09 in 1982 to 0.21 in 1952, whereas the corresponding ratios for shares and bonds are only 0.02 and 0.03.

[5] The equation relating consumer's (saver's) behavior to personal income and other variables is at the centre of the Keynesian analysis and remains the centrepiece of most macromodels. In the context of a complete model, it determines the effect of changes in government policy on personal consumption (saving). Keynes (1936) suggested that consumption depended on actual or absolute levels of personal income. Friedman (1957) puts special emphasis on the lifetime-expected or permanent income: fluctuations in actual or transitory income are not accompanied by changes in consumption but by savings being increased or reduced. Ando and Modigliani (1963) formulated the life-cycle hypothesis: individuals dissave in young adulthood and save later in working life to cater for retirement. The last two theories are distinct but hard to disentangle empirically as both relate consumption to current and lagged income and wealth. However, in the early 1970's equations relating consumption solely to one of the above definitions of income failed to predict the increase in the saving ratio that took place with the rise in inflation [see Townend (1976)]. The specifications described below attempt to overcome these difficulties by taking into consideration a variety of other determinants, too.

according to which income redistribution in favour of the lower income groups is apt to reduce saving, does not seem to be borne out unquestionably by econometric studies [Lubell (1947), Dernburg-McDougall (1976)].

The price level is expected to be negatively correlated with deposits since inflation reduces the real value of saving(s) and increases the effective income tax rate. In the deposits function, inflation is taken into consideration in different ways: Somermeyer-Bannink (1973) utilize Fisher's real interest, i.e. the difference between nominal interest rate and inflation rate; the Central Planning Bureau for the Netherlands (1970) uses the nominal interest rate separately from the inflation rate; Hilton-Crossfield (1970) deflate income and consumption by the proper indices. In other studies the current price level is replaced or supplemented by the expected price level.

Population is used as an independent variable in the saving (consumption) function in relatively few models [Klein-Goldberger (1955)]. More often it is used as a denominator for the conversion of aggregates into per capita figures [Hamburger (1955)]. The effect of population expansion on saving(s) cannot be predicted. A relatively recent demographic explosion is likely to increase the consumption needs of households, whereas a demographic explosion in the remote past will work towards a rise in deposits. Neither of the two cases, however, seems to apply to Greece in the period under review.

Finally, the coefficient on opportunity cost is expected to be negative. The alternative uses of the non-consumed part of income to be examined are investments in private dwellings and shares. The remaining kinds of investment (gold, jewelry, bonds, landed property, works of art etc.) will be excluded from the analysis[6] either because they represent only a small portion of aggregate savings or because available data are not sufficient for estimating the corresponding rates of return.

Estimation of wealth often meets with insuperable difficulties. Usually it is proxied by a liquid asset variable [Klein-Goldberger (1955), Surrey (1970)] or by the sum of liquid assets and net property value [Hilton-Crossfield (1970)]. Hamburger (1955) used the indebtedness of households and Klein (1958) the sum total of savings from 1896 onwards. Data in Greece do not allow a direct estimation of wealth. We had therefore to use the following proxies:

(i) The expected income, which was calculated according to the implicit Koyck lag structure. By letting S stand for savings, Y for personal disposable income, Z for remaining explanatory variables, a_i for original parameters, λ $(0<\lambda<1)$ for the lag coefficient and u for the error term, the savings function takes the following form[7]:

[6] Several arguments can be made both for and against including consumer durables in any saving figure. For more details, see A. Munnall "The Effect of Social Security on Personal Saving" Ballinger Pub., Co., Cambridge, Mass., 1974, pp 108–109.

[7] Equation (2.1) is a fairly conventional savings function which explains savings in terms of lagged savings and aggregate disposable income. This kind of savings function is usually associated with the permanent income hypothesis and the Koyck transformation. It can however be derived by referring to

$$S_t = a_0(1-\lambda) + a_1 Z_t - a_1 \lambda Z_{t-1} + a_2 Y_t + \lambda S_{t-1} + (u_t - \lambda u_{t-1}) \qquad (2.1)$$

(ii) The wealth as estimated by Houthakker-Taylor (1970). In particular, the non-measurable element of wealth is initially used as an explanatory variable but, after certain manipulations, it is replaced by other measurable variables. Thus, by letting W stand for wealth in the original savings function and b_i and v for the coefficients and the error term respectively in the new formulation, Houthakker-Taylor's version of the savings function takes the following form:

$$S_t = \beta_0 + \beta_1 S_{t-1} + \beta_2 \Delta Z + \beta_3 Z_{t-1} + v_t \qquad (2.2)$$

where Δ is the backwards first difference operator.

(iii) The portfolio approach of Christ (1963), according to which investors' behaviour is adjusted so as to maximise the utility they derive from the alternative forms of investment.[8] By letting MC stand for the stock of liquid assets, S for savings and Z_0 for the other elements of wealth, the utility function in the context of the CES function is of the following form:

$$U = [a(MC)^{-\rho} + bS^{-\rho} + cZ_0^{-\rho}]^{-1/\rho} \qquad (2.3)$$

A rational investor's portfolio selection is expected to maximise his utility under the constraint of his total wealth, i.e.

$$W = MC + S + Z_0 \qquad (2.4)$$

Dividing the first derivative of the Lagrange equation with respect to S by its first derivative with respect to MC we get:

$$\log S = \frac{\log(b/a)}{1+\rho} + \log(MC) \qquad (2.5)$$

Parameters a and b represent the return on liquid assets and savings respectively, so that they cannot be treated as constant. Thus, we assume that:

– investor's preferences for liquid assets are affected by the size of real income (Y) and the inflation rate ($\dot{p}$), according to the equation

$$a = a_0 Y^{a_1} e^{a_2 \dot{p}} \qquad (2.6)$$

whereas

– their preferences for savings are affected by the size of real income, the inflation rate and some additional factors symbolized by Z, according to the equation

$$b = b_0 Y^{b_1} e^{b_2 \dot{p}} Z^{b_3} \qquad (2.7)$$

the standard partial adjustment mechanism, to nonseparable intertemporal preferences, to the habit persistence hypothesis or to sociological motives with recognition lags [see Deaton and Muellbauer (1980)].

[8] Even though investment in dwellings is the most important alternative to deposits, savers may in principle consider a much wider range of real and financial assets like consumer durables, shares and bonds.

By substituting equations (2.6) and (2.7) into (2.5), the savings equation is expressed as follows:

$$\log S = c_0 + c_1 \log Y + c_2 \dot{p} + c_3 \log Z + c_4 \log MC \qquad (2.8)$$

After the specification of the wealth variable, we proceed to the estimation of the deposits function. National income, deposits, liquid assets etc. are stated on a per capita basis with a view towards

– avoiding a possible specification error, which the omission of the population variable might have resulted in, and
– reducing multicollinearity as well as saving degrees of freedom.

Per capita deposits and income are measured in both current and constant (1970) prices. Real deposits and real income are constructed by dividing nominal deposits and nominal income by the actual GNP price deflator.

Equation (2.1) is the first form of the deposits function to be estimated. The notation is as follows:

S = per capita private deposits,

Y^e = expected (or permanent) per capita personal disposable income, determined by the adaptive expectations technique, which is equivalent to the Koyck lag structure,

Z = a vector of the following variables:

a) The weighted average interest rate for private deposits, R.

b) The current inflation rate, $\dot{P}_t = (P_t - P_{t-1})/P_{t-1}$, or the expected inflation rate, $\dot{p}^e$, which is determined by the adaptive expectations technique, or the price level, P.

c) The labour share in national income, LS, as a proxy for the inequalities in income distribution.

d) The return on investments in shares and dwellings (M and K respectively) as a measure of the explicit opportunity cost of deposits.

e) A dummy variable, $DV1$, which has values of 1 for 1974 (restoration of democracy and crisis in Cyprus) and 0 for all other years.

Thus, the first form of the private deposits function —after the transformation suggested by McCallum (1970) to cope with the problems of autocorrelation and multicollinearity and the existence of many explanatory variables— is

$$S_t = A_0 + A_1 Y_t + A_2 R_t + A_3 \dot{P}_t + A_4 (LS)_t + A_5 M_t + A_6 K_t$$
$$+ A_7 DV1 + A_8 S_{t-1} + A_9 S_{t-2} + \varepsilon \qquad (2.9)$$

where A_i $(i = 1 \cdots 9)$ are the reduced form coefficients.

The right-hand side of (2.9) contains the dependent variable lagged one or two periods. To correct for autocorrelation, we can assume that the autocorrelation coefficient is equal to one, in which case the absolute values of the variables should be replaced by their first differences. Since however this assumption is strict, we preferred using the annual rates of change of the variables when the fit tended to improve. The model is estimated by ordinary least squares (OLSQ) or the first order Cochrane-Orcutt procedure (CORC) to correct for autocorrelation.

The second form of the deposits function, which refers to the saving (flows) concept —in contrast with (2.9), which refers to the savings (stocks) concept— is specified in equation (2.10):

$$\Delta S_t = a_0 + a_1 Y_t + a_2 R_t + a_3 \dot{P}_t + a_4 M_t + a_5 K_t + a_6 (LS)_t + a_7 (DV1) + u_t \quad (2.10)$$

where ΔS = per capita annual additions to the stock of deposits (or new deposits) and Y = current per capita disposable income. In both equations, (2.9) and (2.10), we use either the nominal interest rate and the nominal return on shares and dwellings or the real ones ($R-\dot{p}$, $M-\dot{p}$, $K-\dot{p}$ respectively).

Equation (2.8) is the third form of the deposits function to be estimated, with Z including the interest rate, the return on dwellings and the dummy variable. In particular, we have:

$$\log(\Delta S)_t = a_0 + a_1 \log Y_t + a_2 \log R_t + a_3 \log K_t + a_4 \log \dot{P}_t$$
$$+ a_5 \log(MC)_t + a_6 (DV1) + u_t \quad (2.11)$$

Finally, equation (2.2), which refers to the savings concept, is the fourth form of the deposits function:

$$S_t = a_0 + a_1 Y_{t-1} + a_2 dY + a_3 R_{t-1} + a_4 dR + a_5 P_{t-1} + a_6 dP + a_7 K_{t-1}$$
$$+ a_8 dK + a_9 DV1 + a_{10} S_{t-1} + u_t \quad (2.12)$$

Since (2.12) contains many independent variables (twelve if we include the return on shares), we had to choose the most important of them, on the basis of various econometric criteria.

The estimates of the parameters of the deposits functions are presented in Table 2.1. Considerable experimentation with various combinations of the explanatory variables led to the adoption of the most reliable of them, on the basis of the statistical significance of the coefficients, the value of the coefficients of determination, the Durbin-Watson statistic, the best fit in terms of the match between estimated and anticipated coefficient signs and so on.

Here, our evidence concerning the nature and the features of the private deposits function must be evaluated carefully:

- The coefficients of multiple correlation indicate a reasonably good fit to the data. Only a few variables are not statistically significant at the 5% level; of these, most are significant at the 10% level.
- The coefficient on current disposable income is (positive and) statistically significant in all cases. The marginal propensity to deposit out of income at current prices ranges between 0.26 and 0.30, as far as the savings concept is concerned, and between 0.11 and 0.19, as far as the saving concept is concerned.
- The coefficient on return on dwellings is of the anticipated (negative) sign and statistically significant in six (out of seven) equations. On the contrary, the coefficient on return on shares is insignificant in all equations. This means that

TABLE 2.1. OLSQ AND CORC ESTIMATES OF DEPOSITS (R^2 is the coefficient of multiple correlation; t-statistics are reported in parentheses)

1) $S=-8779.4+0.26Y-30452.3R+194.33M-5835.5\dot{P}+19263.32LS+0.61S_{-1}$

(−2.5) (6.4) (−2) (1) (−1.8) (2) (7.1)

OLSQ, $R^2=0.9998$, DW=2.11, at current prices

2) $S=2054.8+0.30Y-76395.2R-7975.4K-200.3M+473.6DV1+0.76S_{-1}-30.9P$

(2.3) (8.9) (−4.5) (−4.3) (−0.9) (0.5) (12.3) (−1.5)

CORC, $R^2=0.9998$, DW=2.69, $\rho=-0.85$, at current prices
(−6.42)

3) $S=-15968.8+0.44Y+1118.7R+234.4M-4552.5\dot{P}+25867.6LS+0.32S_{-1}$

(−3.96) (4.12) (0.08) (1.2) (−1.01) (2.74) (1.6)

OLSQ, $R^2=0.9964$, DW=1.58, at constant prices

4) $\Delta S=3081.7+0.19Y-87628.5R-16210.8K-350.6M+8587.1\dot{P}+1675.1DV1$

(2.43) (9.86) (−3.06) (−4.5) (−1.3) (1.3) (1.2)

CORC, $R^2=0.9896$, DW=2.6, $\rho=-0.91$, at current prices
(−8.7)

5) $\Delta S=-4371.5+0.112Y+2253.8K-38.9M-21835.46\dot{P}+2807.8DV1+69211.6R_{-1}$

(−2.6) (7.5) (0.4) (−0.12) (−2.2) (1.5) (2.3)

CORC, $R^2=0.9856$, DW=2.40, $\rho=-0.97$, at current prices
(−15.3)

6) $\log\Delta S=-28.3+5.5\log Y-1.6\log R-0.78\log K-0.04\log\dot{P}+0.79DV1-2.5\log MC$

(−5.7) (3.7) (−2.98) (−3.8) (−0.31) (2.12) (−1.96)

CORC, $R^2=0.967$, DW=1.78, $\rho=-0.58$, at current prices
(−2.8)

7) $S=-3435.6-0.065Y+0.114dY+34360.3R_{-1}-51316.6dR+46.9P_{-1}-195.5dP$

(−4.6) (−0.51) (1.99) (1.79) (−2.55) (1.6) (−5.9)

$+2730.2DV1+1.3S_{-1}$

(1.96) (6.94)

CORC, $R^2=0.9999$, DW=2.30, $\rho=-0.55$, at current prices
(−2.55)

investment in dwellings is the main factor which competes against deposits in Greece, as they are not affected by transactions on the Stock Exchange. The evidence underlines the structural deficiencies of the Greek Economy and the inability of savers to canalize the non-consumed part of their income into alternative uses, except for deposits and investments in dwellings.

– The effects of interest rate are indeterminate, as the relative coefficient is sometimes negative and/or significant and sometimes positive and/or insignificant. Using real interest rate (nominal interest rate minus rate of inflation) proved to be more consistent, as the corresponding coefficient was positive, though not always statistically significant. However, had we opted for the real interest rate, we would not have been able to distinguish between the effects of interest rate and inflation. Thus, we have decided to treat each variable separately.

There is only one case in which the effects of nominal interest rate can be positive and significant: if we assume that it takes time for investors to adjust the composition of their portfolio to the higher interest rate on deposits (re-estimation of return on alternative forms of investment, transfer of capital from one use to another etc.), then variations in deposits will reflect interest rate changes in the previous period. This assumption is verified in equations 5 and 7, where the regression of both new deposits (flows) and accumulated deposits (stocks) on lagged interest rate resulted in positive and significant coefficients.

- The price level or its growth rate exert a rather insignificant (but usually negative) influence on deposits. This should be attributed to the inability of savers to channel their funds into other uses (except for dwellings and deposits) because of the insufficient operation of the Stock Exchange. Thus, price-level changes cannot affect substantially savers' decisions as to how to dispose of their available funds.
- The coefficient on the labour share in national income is positive and significant at the five percent level. This means that the recent incomes policy target of redistributing national income in favour of wages and salaries has encouraged deposits, as all basic needs of employees and workers seem to have been satisfied. Therefore, the evidence does contradict the Keynesian postulate, according to which redistribution of income in favour of the lower income classes tends to reinforce aggregate demand.
- The dummy variable has the opposite of the anticipated sign; thus, the evidence suggests that the extraordinary political conditions prevailed in 1974 did not lead to a lower level of deposits, as normal political life was restored during the same year and the government set a limit (5.000 dr. or $166) to withdrawing money from deposits accounts.
- The coefficient on liquid assets (basically currency circulation) is negative and significant because deposits and currency circulation are the constituent components of money supply. A reduction in deposits, ceteris paribus, must be counterbalanced by an expansion in currency circulation, if current transactions are to be normally conducted.[9]
- To test for autocorrelation we used either the Durbin-Watson statistics or the statistical measure h.[10] No autocorrelation was detected in either case. To minimize further the possibility of getting biased estimates, we substituted growth rates for absolute values of variables in all deposits functions; however, this substitution did not improve their fit with the exception of equations 1, 2 and 3.

Preceding empirical observation is not intended, of course, as a general explanation of deposits. However, it provides us with useful information as to the

[9] In the commonly used terminological system with money defined as currency plus deposits, increases in savings-deposits imply an offsetting reduction in the quantity of money [see Miller (1984)].

[10]
$$h=(1-0.5d)\sqrt{\frac{n}{1-n\cdot \mathrm{Var}\left(\frac{S}{N}\right)_{-1}}},$$

where d is the Durbin-Watson statistics and n the number of observations.

factors which determine savers' behaviour and facilitates the selection of the best fitting deposits equations for further analysis. The next step is to specify the price and wage functions because both the price level, which is used as an explanatory variable in all deposits functions, and the wage rate which is used as an explanatory variable in the price function cannot be treated as exogenous.

III. THE PRICE AND WAGE FUNCTIONS

According to the demand-pull and cost-push inflation theories, the growth rate of prices depends on the growth rates of the various cost elements and the size of excess demand [McCallum (1970), Solow (1969), Brechling (1972) etc.]. The cost elements which enter into the price function as explanatory variables are the agricultural product price deflator (P_A), the index of average value of imports (P_M), the wage rate (W), the ratio of profits to total capital assets (Pr) and the proportion of indirect-tax revenue to total private consumption expenditure (T_i/C). Excess demand corresponds to the ratio of real consumption expenditure (or, alternatively, real GNP) to its normal level, which is determined by its long-term trend. Thus, the price function takes the following form:

$$\dot{P}=a_0+a_1\dot{P}_A+a_2\dot{W}+a_3\dot{P}_M+a_4\dot{P}r+a_5\dot{\left(\frac{T_i}{C}\right)}+a_6\left(\frac{C}{\bar{C}}\right) \qquad (3.1)$$

where the dot above each variable denotes annual rates of increase and $\bar{C}$ stands for the normal level of real consumption. After considerable experimentation with alternative forms, we ended up with the following best fitting equation for the normal level of real consumption (t-ratios are listed in parentheses):

$$\log\bar{C}=\underset{(1042,2)}{11,8}+\underset{(28,8)}{0.065t}+\underset{(6.9)}{0.214\text{DVC}}-\underset{(-7.6)}{0.024\text{DVS}} \qquad (3.2)$$

OLSQ, SE=0.0146, R^2=0.9974, DW=1.69

where

t = the time variable,

DVC = a dummy variable for the constant term, which has values of 0 for the period 1949–1972 and 1 for the period 1973–1983, in an attempt to capture the effects of staginflation during the last period on the long-run trend of real consumption expenditure, and

DVS = a dummy variable for the slope, which has values equal to the product $t\cdot$DVC, i.e. zero for the period 1949–1972 and t for the period 1973–1983, in order to test the hypothesis that staginflation of the last period has influenced the slope of the real-consumption function.

The theoretical values of normal consumption, derived from (3.2), are subtracted from the observed values of consumption, $\log C_t-\log\bar{C}_t=\log C_t/\bar{C}_t$. The antilogarithm of the last relationship corresponds to the value of excess demand.

TABLE 3.1. ESTIMATES OF THE PRICE FUNCTION (3.1) [t-ratios are listed in parentheses]

1) $\dot{P} = -1.29 + 0.105\dot{P}_A + 0.312\dot{W} + 0.455\dot{P}_M + 0.09(\dot{\overline{T_i/C}}) + 1.27(C/\bar{C})$
   (−1.67) (1.77) (2.61) (5.11) (0.79) (1.64)
   $R^2 = 0.9608$, DW = 2.07, $\rho = -0.39$, SE = 0.021

2) $\dot{P} = -1.28 + 0.105\dot{P}_A + 0.315\dot{W} + 0.454\dot{P}_M + 0.0006\dot{P}r + 0.087(\dot{\overline{T_i/C}}) + 1.26(C/\bar{C})$
   (−1.4) (1.56) (1.88) (4.25) (0.03) (0.64) (1.37)
   $R^2 = 0.9608$, DW = 2.07, $\rho = -0.39$, SE = 0.022

Demand is considered to be excessive (inadequate) when real consumption is greater (smaller) than its normal level, i.e. when $C/\bar{C} > 1$ ($C/\bar{C} < 1$). Due to the downward rigidity of prices, excess demand is expected to raise them, whereas inadequate demand cannot reduce them. This means that, for values of the ratio $C/\bar{C}$ lower than unity, the ratio is set equal to unity when the price function (3.1) is estimated.

Next, we come to the estimation of the price function (3.1). The estimates, which are obtained using the Cochrane-Orcutt iterative technique to correct for autocorrelation, are presented in Table 3.1. From the inspection of this table, the following conclusions can be drawn:

– The coefficients of multiple correlation indicate a reasonably good fit to the data, whereas the Durbin-Watson statistics, which are not significantly different from 2.0 for each regression, indicate the absence of distortion from serial correlation.
– The coefficient on profits is statistically insignificant (see equation 2) so that the omission of this variable does not affect seriously the explanatory power of the price function (see equation 1). This means that profits do not contribute to price-level variations and can be ignored in the subsequent analysis.
– The growth rate of the index of average value of imports plays the most critical role in explaining inflation, as it accounts for about half the growth rate of the consumer price index (CPI). The relative elasticity has been estimated at 0.53.
– The wage rate affects the price level to a smaller extent than imported inflation. In particular, the elasticity of the growth rate of CPI with respect to the growth rate of wages has been estimated at 0.45.
– The effects of both the agricultural product price deflator and the excess demand on CPI are not so strong, whereas indirect taxes do not have any statistically significant impact on this index.

The general conclusion emerging form all of the above evidence is that inflation in Greece is of the cost-push type.

In testing whether the monetarists' view on inflation forms a more acceptable basis for explaining price-level changes in Greece, we estimated the macroeconomic monetary model which investigates inflation in the context of a reduced form equation, with the determinants of both inflationary expectations and excess demand used as explanatory variables [Diz (1970), Friedman (1969)]. Even though most of the variables in the monetary model have approximately the same explanatory power as in the demand-pull and cost-push inflation model, we will not concern ourselves with the monetarists' position due to the contradictory behaviour of the excess money-supply variable.[11]

The wage function is examined in terms of a modified form of the Phillips curve.[12] Since the inverse relationship of the growth rate of wages to the unemployment rate proved insufficient to interpret the long-run wage behaviour, additional variables were added to the original function,

$$\dot{W}=a_0+\frac{a_1}{u},$$

where $\dot{W}$ is the growth rate of wages and u is the unemployment rate ($a_0<0$, $a_1>0$).

Following monetarists, expected inflation was added to account for the fact that negotiations between labour unions and employers concern mainly future wages. Since improvements in productivity are alleged to absorb a portion of the increasing wage cost, labour productivity may also be added to the wage equation.

Specification of excess demand for labour is difficult and various reasonable alternatives exist. Data for the number of vacancies in industry are not available. Therefore, we cannot measure excess demand for labour by using only the number of unemployed industrial workers. Moreover, there are no data for the portion of the total labour force in employment, so that we cannot estimate the unemployment rate. Consequently, we had to substitute working hours per week in industry for the number of vacancies; the reasoning is that an increase (reduction) in working hours per week denotes, ceteris paribus, an increase (reduction) in the number of vacancies. The combination of both the number of unemployed industrial workers and the working hours per week serves as a proxy for the excess demand for labour.

From the preliminary estimates of the coefficients of the wage function, it became evident that the best fitting equation was obtained when we substituted the growth rates of wages, prices, working hours per week and productivity for the corresponding absolute values. Moreover, it was found that wages are affected by the unemployment rate of the previous period.

The last variable to be added to the wage function is a dummy variable to capture the effects of incomes policy on the wage rate. This is necessary as incomes policy may neutralize the effects of both the cost elements (inflation) and the excess demand (unemployment and working hours) on wages. The application of incomes-policy rules started virtually in 1974. Up to 1973, price level changes were negligible, so that wages used to be readjusted just to account for improvements in average labour productivity. This norm allowed productive units with pro-

[11] More details are available upon request.

[12] The alternative hypothesis of Modigliani-Tarantelli (1973) was also tested but the results were not satisfactory.

TABLE 3.2. ESTIMATES OF THE COEFFICIENTS OF THE WAGE EQUATION (3.4)

1)	$\dot{W}=0.112+0.125\dot{p}+0.312u_{-1}-0.19\dot{h}+0.045\dot{y}+0.178DV2-0.44\dot{W}_{-1}$
	(2.22) (0.34) (0.51) (−0.24) (0.16) (2.31) (−1.21)
	$R^2=0.893$, DW=1.95, $\rho=-0.23$, SE=0.033
2)	$\dot{W}=0.096+0.257\dot{p}-0.098u_{-1}+0.49\dot{h}+0.10DV2$
	(2.16) (1.28) (−0.16) (0.82) (3.50)
	$R^2=0.8594$, DW=2.84, SE=0.045

ductivity above the average level to enlarge their profit margins significantly. However, the strong inflationary pressures during the period 1974–1983 called for a revision of incomes-policy goals: the restoration of the curtailed purchasing power of wage (and salary) earners and the increase in the labour share to compensate for the losses of the previous years came up to the fore as targets of absolute priority, thus leading to a wage—price spiral. As a result of the re-orientation of incomes-policy goals, the effects of autonomous cost and demand elements on wages became weaker, in contrast with the gradually growing importance of incomes-policy measures.

In accordance with the above analysis, the wage equation is specified as

$$\dot{W}=a_0+a_1\dot{p}^e+a_2u_{-1}+a_3\dot{h}+a_4\dot{y}+a_5DV2 \qquad (3.3)$$

$$(0<a_1<1,\ a_2<0,\ a_3>0,\ a_4>0,\ a_5>0)$$

where h is working hours per week, y is productivity, $DV2$ is a dummy variable, which has values of 0 for the period 1949–1973 and 1 for the period 1974–1983, and $\dot{p}^e$ is the expected rate of inflation, determined by the adaptive expectations technique. Thus, the reduced-form wage function is specified as

$$\dot{W}=A_0+A_1\dot{p}+A_2u_{-1}+A_3\dot{h}+A_4\dot{y}+A_5DV2+A_6\dot{W}_{-1} \qquad (3.4)$$

where $A_0=a_0(1-\lambda)$, $A_1=a_1(1-\lambda)$, $A_6=\lambda$ and so on.

The estimates, which are obtained by using the Cochrane-Orcutt iterative technique, are presented in Table 3.2

The R's indicate a reasonably good fit to the data; the Durbin-Watson statistics also indicate the absence of autocorrelation at the .05 level. However, the first equation must be excluded because the variables of unemployment rate, working hours per week and lagged wage rate had the opposite of the anticipated sign.

IV. ECONOMIC-POLICY MEASURES AND PRIVATE DEPOSITS

In the preceding sections we investigated separately the factors which determine deposits, prices and wages, without taking into consideration the interdependence of the corresponding sectors. In what follows, we shall combine both the price equation and the wage equation with five of the most reliable forms of the deposits function. This amounts to estimating five simultaneous-equation systems. By

TABLE 4.1. 2SLSQ ESTIMATES OF DEPOSITS, PRICES AND WAGES (t-statistics are reported in parentheses. The $\bar{R}^2$ is the coefficient of determination adjusted for degrees of freedom, S.E. is the standard error of the regression and DW is the second stage Durbin-Watson statistic. The Durbin-Watson statistic is difficult to interpret when using a simultaneous equation estimator and it is biased toward two which indicates the absence of autocorrelation when lagged dependent variables appear as explanatory variables in a regression. However, the test may be expected to hold approximately)

System A′ (constant prices)

$$\dot{S}=0.055+0.964\dot{Y}+2.36R-0.397\dot{P}+1.29\dot{\overline{LS}}+0.015M-0.57K+0.55\dot{S}_{-1}+0.13DV1$$
(−0.62) (1.59) (2.22) (−0.65) (2.79) (0.72) (−2.12) (1.86) (1.61)

$R^2=0.9242$ ($\bar{R}^2=0.8376$), DW$=2.20$, SE$=0.037$

$$\dot{P}=-0.89+0.114\dot{P}_A+0.28\dot{W}+0.459\dot{P}_M+0.065\dot{\overline{T/C}}+0.88C/\bar{C}$$
(−1.03) (1.89) (2.15) (4.82) (0.58) (1.01)

$R^2=0.9575$ ($\bar{R}^2=0.9362$), DW$=2.43$, SE$=0.021$

$$\dot{W}=0.098+0.25\dot{P}-0.114U_{-1}+0.49\dot{h}+0.10DV2$$
(2.19) (1.23) (−0.19) (0.82) (3.53)

$R^2=0.8594$ ($\bar{R}^2=0.808$), DW$=2.84$, SE$=0.033$

random mean square percent error (RMSPE)$=0.034$

System B′ (current prices)

$$S=-3.436-0.065Y_{-1}+0.114dY+34360R_{-1}-51317dR+46.9P_{-1}-195.5dP+1.3S_{-1}+2730DV1$$
(−4.57) (−0.51) (1.99) (1.79) (−2.55) (1.61) (−5.86) (6.94) (1.96)

$R^2=0.9999$ ($\bar{R}^2=0.9998$), DW$=2.30$

$$\dot{P}=-1.29+0.105\dot{P}_A+0.312\dot{W}+0.455\dot{P}_M+0.089\dot{\overline{T/C}}+1.27C/\bar{C}$$
(−1.67) (1.77) (2.61) (5.11) (0.79) (1.64)

$R^2=0.9608$ ($\bar{R}^2=0.9412$), DW$=2.07$, SE$=0.021$

$$\dot{W}=0.096+0.257\dot{P}-0.098U_{-1}+0.49\dot{h}+0.10DV2$$
(2.15) (1.28) (−0.16) (0.82) (3.50)

$R^2=0.8594$ ($\bar{R}^2=0.808$), DW$=2.84$, SE$=0.012$

random mean square percent error$=0.037$

focusing then on the deposits function, we will be able to evaluate the impact of economic policy measures on deposits.

A simultaneous equation estimator is appropriate for estimating the parameters of the model when overidentified equations are present. The two-stage least-square estimator was selected because it corrects for simultaneous equation bias and gives consistent estimates of the parameters. The two-stage least-square estimates were used to forecast the values of the dependent variables, given the values of the explanatory variables. The forecasting performance of the systems was examined by using prediction-realisation diagrams and various other criteria (Theil's inequality coefficient, random mean square error, random mean square percent error). From a prediction point of view, only two of the five simultaneous-equation systems proved reliable, namely those with the following dependent variables: the growth rate of per capita savings at constant prices and per cap savings at current prices according to Houthakker-Taylor's model. The two-stage least-square estimates are as follows:

The structural models of Table 4.1, which depict the mechanism of deposits formulation in terms of direct determinants, are only an implicit description of the relative process. The level of deposits however may be found explicitly in terms of predetermined variables alone, when the reduced-form version of the models is properly estimated according to the method described by Goldberger (1970). To this end, the structural equations of the two models are linearized by setting the variables at their most recent value over the sample period (1983). Since the models serve economic policy purposes, the best possible approximation is obtained if we choose as a linearization point that defined by the latest available data. As a result of the linearization procedure, all the variables are expressed in terms of first differences.

The reduced form of the model in matrix form [see also Balopoulos (1967)] is

$$y = B^{-1}Cx = Ax$$

where y is the column vector of the changes in the endogenous variables, B the matrix of coefficients of the endogenous variables, C the matrix of coefficients of the predetermined variables, x the column vector of the changes in the predetermined variables and $A = B^{-1}C$ the matrix of reduced form coefficients. The elements in the matrix A represent the impact multipliers.

At first, our attention will be concentrated on the deposits-function row vectors. In Table 4.2 we present the reduced-form row vectors for deposits (for convenience sake, they are presented in a transposed form). Each vector defines the reduced form equation for deposits of the corresponding systems.

The elements of each row in Table 4.2 are the partial derivatives of the corresponding predetermined variable with respect to savings and define short run responses of savings to this variable. A brief discussion of several aspects of our findings in Table 4.2 is in order. A unitary increase in disposable income leads to an expansion of savings at constant prices by 0.44, according to system A, and an expansion of savings at current prices by 0.11, according to system B; a higher interest rate by one percentage unit increases savings at constant prices by 4.16 billion drs according to system A, but lowers savings at current prices by 4.95 billion drs according to system B; the adverse effects of both the agricultural product price deflator and imported inflation on savings are much stronger in system B than in system A, but this may be attributed to the fact that savings in system A are measured at constant prices. Note that the adverse effect of an increase in the index of unit value of imports is stronger than an equivalent increase in the agricultural product price deflator in both systems. This denotes the greater importance of imported commodities—which are usually classified as (semi)luxuries—in the expenditure pattern of the average Greek consumer, in contrast with agricultural products, which are mainly domestically produced foodstuffs. The negative sign of the coefficient on excess-demand variable in both systems means that every fiscal or incomes-policy measure, which aims at increasing aggregate demand is apt to result in reduced savings. It should also be

TABLE 4.2. THE REDUCED FORM MATRIX OF THE DEPOSITS FUNCTIONS

Predetermined variable	System A	System B	Predetermined variable	System A	System B
$dS:dN$	92.37	50413.44	$dS:dN_{-1}$	−1478	−52928.7
dY	0.445	0.114	dY_{-1}	−0.467	−0.183
dR	416269.6	−494820.7	dS_{-1}	1.59	1.33
$d(LS)$	484067	—	dP_{-1}	0.013	16.9
dM	2642.4	—	$d(LS)_{-1}$	−479930.8	—
dK	−100412	—	$d(P_A)_{-1}$	28.1	214.5
dP_A	−23.1	−176.3	dW_{-1}	−0.009	−0.004
dP_M	−95.3	−783.3	$d(P_M)_{-1}$	128.5	1056.8
$d(C/\bar{C})$	−65888	−793317	dU_{-1}	2398.2	19039.6
			dN_{-2}	10659	—
dh	−251.8	−2321.7	dS_{-2}	−1.10	—

mentioned that a decrease in working hours per week will increase savings, as the relative coefficient is negative in both systems. This means that any contractual expansion of the workers' leisure time is not offset by moderate wage claims on the part of labour unions; thus, savings are not adversely affected. Lastly, unemployment appears to influence insignificantly but favourably savings in both systems. In depression, when the unemployed are deprived of any wage income and workers' remunerations are not improved in real terms, a lower level of deposits would be expected. This is not however the case because of the uncertainty created by slack economic conditions; i.e. workers, being conscious of a possible dramatic deterioration of their standards of living, tend to curtail as many consumption expenditures as possible and build up a stock to confront future contingencies. It goes without saying that a longer and deeper depression may lead to extensive dissaving but such conditions did not prevail in the period under review.

From the reduced-form row vectors for deposits in Table 4.2 we can derive the values of short-run elasticities of deposits with respect to their main determinants. We can also derive the values of the corresponding long-run elasticities, if we postulate stationary equilibrium conditions. The estimates of the elasticities are presented in Table 4.3.

Our empirical results reveal considerable differences between short-run and long-run elasticities. The most remarkable difference refers to the income elasticity of savings in system A: an increase in real disposable income by 10% will lead to an equiproportionate expansion of real savings in the short-run but will reduce them by 1% in the long run. This may be attributed to the fact that the initial expansion of demand sets in motion a process of successive increases in future incomes—through the multiplier effects—which causes a shift of individuals to higher income levels. Thus, individuals can satisfy needs which, although desirable, could not be satisfied with the limited income of the past but, at the same time, they may have to liquidate at least a portion of the accumulated stock of savings. Such an analysis

TABLE 4.3. SHORT-RUN AND LONG-RUN ELASTICITIES OF DEPOSITS WITH RESPECT TO THEIR MAIN DETERMINANTS

	System A′ (constant prices)		System B′ (current prices)	
	Short-run elasticity	Long-run elasticity	Short-run elasticity	Long-run elasticity
$dS/S: dN/N$	0.005	1.01	0.755	0.11
dY/Y	0.96	−0.10	0.245	0.45
dR/R	0.34	0.665	−0.11	−0.22
$d(LS)/LS$	1.28	0.02	—	—
dM/M	0.001	0.002	—	—
dK/K	−0.16	−0.32	—	—
dP_A/P_A	−0.06	0.02	−0.12	−0.08
dP_M/P_M	−0.26	0.18	−0.59	−0.62
$d(C/\bar{C})/(C/\bar{C})$	−0.38	−0.74	−1.23	3.71
dh/h	−0.06	−0.001	−0.15	0.005
dU_{-1}/U_{-1}	0.0004	0.0008	0.0009	−0.003

may be valid for the particular consumer or a subtotal of consumers but, when we refer to the population, we must discern two categories of savers: one that dissaves to satisfy needs for the first time (purchase of consumer durables, recreation etc.) and another that is in the process of building up the stock of savings. Thus, it is not possible to predict in which direction savings will move in the long-run, after a given increase in current income; they may decrease as shown by system A, or expand, as shown by system B.

The long-run elasticity of savings with respect to interest rate is twice as high as the short-run elasticity in both systems (positive in system A and negative in system B). On the contrary, the long-run elasticity of savings with respect to the labour share in national income is almost zero, under stationary equilibrium conditions (see system A). As happened with real disposable income, the expansion of the current labour share results in a substantial increase in real savings during the same year. In subsequent years, however, wage-earners may reduce accumulated savings in order to finance the purchase of consumer durables (and other goods), to which they had no access before the redistribution of income. The long-run adverse or neutral effect of real disposable income and labour share on savings does not show itself in the annual time-series data for savings. This is so because the short-run favourable effects of the annual increases in both real disposable income and labour share on savings tend to conceal their long-run unfavourable effects.

The long-run elasticity of savings with respect to return on dwellings is twice as high as the corresponding short-run elasticity (see system A). By contrast, the long-run elasticity of savings with respect to the agricultural product price deflator is lower (in absolute terms) than the short run elasticity in both systems (positive in system A and negative in system B); the same is true for the elasticity of savings with respect to the index of unit value of imports (except for system B). The gradually weakening adverse effects of the agricultural product price deflator on savings may be attributed to the fact that income redistribution from urban to agricultural population, through the price-support policy in the primary sector, neutralizes partially or totally the short-run negative impact of the more expensive foodstuffs on urban sector's savings. On the other hand, the gradually weakening adverse effects of the index of unit value of imports on savings may be attributed to the fact that imported items are mainly (semi)luxuries, with a price elasticity of demand in excess of unity (at least for the lower and middle income levels). At any (impending) essential rise in import prices, consumers rush into anticipatory buying and reduce their savings. In subsequent years, however, cosumers' behaviour is smoothed out as satiation from imported commodities and their higher prices lead to a proportionately larger reduction in their demand. Thus, an increasing proportion of income can be directed to the banking sector in the long-run.

The short-run adverse effects of excess demand on savings may grow stronger in the long-run (see system A) or become favourable (see system B). Both these tendencies, though in opposite directions, may be interpreted as follows: financing of excess demand requires dissaving on the part of consumers currently and in subsequent years, in so far as a portion of additional purchases is paid for by instalments. On the other hand, excess demand results in increased receipts (and profits) on the part of productive units and this may reverse the initial adverse effects on savings.

The reduction of working hours per week favours savings to a limited extent in the short-run. In stationary equilibrium conditions, however, this favourable effect almost disappears since the decrease in working hours encourages consumption of goods and services which are complementary to leisure. Lastly, the short-run and long-run effects of unemployment on savings seem to be negligible and will not be further investigated. Some studies include the difference in the unemployment rate as an additional variable. It can be interpreted as a proxy for real income uncertainty which affects saving positively according to the uncertainty hypothesis [see Juster and Wachtel (1972)]. However, the coefficient on this variable was also found insignificant.

Even though we have elaborated on the whole conventional procedure of studying the dynamic properties of the deposits function,[13] according to the technique suggested by Goldberger (1970), we will not pursue any further discussion in order to narrow the limits of the study to those areas which are more readily manageable. It should however be emphasized that, according to the values of characteristic roots, both systems proved to be unstable (explosive). The unstable structure of both systems lowers their reliability as means of predicting deposits for remote periods. However, as conditions prevailing in the Greek economy during the last twelve years are volatile, the above systems can not be

[13] Results are available on request.

utilized for predictions at any rate. A step in the right direction would be to re-estimate the two systems for a larger time span, including several years after 1983, when the relative data will be available. This re-estimation will certainly weaken the effects of those factors, which were in force during the "normal" period 1949–1972 but have already ceased to represent the actual forces, which formulate contemporary Greek reality.

V. CONCLUSIONS

In the present study, an attempt was made to trace out the factors which determine deposits in Greece, in the context of a macroeconomic econometric model, which included both the monetary and the labour sectors. The most important factors were found to be disposable income, labour share, return on investments in dwellings, prices of imported items and agricultural products, excess demand and interest rate. No effort was made to select unequivocally a "best" deposits function. Instead, we have examined the approach embodied in the various specifications and have highlighted the behaviour of the personal sector to some extent. Even though our data basis does not allow for rigorous testing, some useful information was obtained from this important topic.

Our analysis provides supporting evidence for the argument that the factors which influence deposits as well as the extent of their impact cannot be determined accurately. This is due to the differentiation of savers' behaviour as a result of the adoption of alternative hypotheses (permanent income, Keynesian view, Houthakker-Taylor's model, portfolio selection) for saving and savings at current and constant prices. Therefore, some of the exogenous variables used in our analysis were not common in all models and estimates of the coefficients ranged between wide margins. However, had we opted for confining the study to one model, our conclusions might be devoid of confusion but would reveal part only of economic reality.

Confusion as to the real explanatory power of the factors which determine deposits may have been intensified by the fact that the period under review, 1949–1983, was composed of two subperiods with dissimilar structural characteristics. The first subperiod, 1949–1972, was marked by very low rates of inflation, high rates of economic growth, limited labour-union activities and positive real interest rates. On the contrary, the second subperiod, 1973–1983, was characterized by high inflation rates, restrained economic activity, expanded labour claims, negative real interest rates and income redistribution in favour of labour.

APPENDIX

Variables and Data Sources

Annual data were used to estimate the parameters of the models. Estimates are based on the sample period 1949–1983.

1) *Deposits*: Savings and time deposits of individuals and private enterprises (including corporations) with commercial banks and specialized credit institutions. Monthly figures are averaged to obtain annual data. Source: Monthly Statistical Bulletins of the Bank of Greece, various issues.

At a first consideration, it may seem desirable that corporate enterprises are excluded from private enterprises. However, many studies of savings behavior employ aggregate (personal and corporate) private savings in the belief that this treatment avoids the identification problem [see, for example, Modigliani, F. "The Life Cycle Hypothesis of Saving and Intercountry Differences in the Savings Ratio" in Induction, Growth and Trade, edited by W. Eltis, M. Scott and J. Wolfe, Oxford University Press, 1970]. Moreover, there is evidence of substantial substitution effects between savings made under different institutional headings. For example, increases in corporate savings may be offset by declines in personal savings; thus, Modigliani (1970) brought evidence indicating unitary substitution between corporate and household savings. Consequently, failure to focus on the behavior of aggregate savings may yield a misleading picture from the viewpoint of aggregate development.

Furthermore, in national income accounting, personal saving is usually defined as personal disposable income not spent on consumption expenditures. On this account, there is some empirical evidence in favor of the hypothesis of subsuming the corporate sector under the household sector (see, for example, Koskela, E. and Viren, M. "Household Saving out of Different Types of Income Revisited" Discussion and Working Paper, No 190, University of Helsinki, 1983), in the sense that corporate retained earnings should be included into the relevant income concept for households.

2) *Disposable private income*: The difference between pre-tax income (net national income plus transfer payments minus government income from property and entrepreneurship) and direct taxes on income. Source: National Accounts of Greece.

3) *Interest rate*: The weighted average of interest rates on savings and time deposits was calculated by using two weights; firstly, the proportion of savings deposits and time deposits to their algebraic sum and, secondly, the time span interest rates were in force in each year. Source: Monthly Statistical Bulletins of the Bank of Greece, various issues.

4) *Price level*: The consumer price index (inflation equals the rate of change of this index). Source: Monthly Statistical Bulletins of the Bank of Greece.

5) *Labour share*: The proportion of total wage and salary income to national income. Despite criticism against using labour share as a measure of income distribution (see for example P. Loftus "Labour's Share in Manufacturing" Lloyd's Bank Review, 1969, P. Nystrom-C. Johnson "Labour's Share: New Evidence in an Old Controversy" Quarterly Review of Economic Business, 1976), this variable was employed since it proved more reliable than existing alternatives. Source: National Accounts of Greece.

6) *Return on shares*: A sample of shares (quoted on the Athens' Stock Exchange) of 25 enterprises was chosen. In estimating return on them, we added up their average rate of return—for the particular share, it equals the ratio of the dividend to the average annual market price—and the capital gain thereon, e.g. the growth rate of the price index of shares. Source: Bulletins of the Athens Stock Exchange.

7) *Return on dwellings*: In estimating return on dwellings, we added up the marginal rate of return on investments in dwellings and the capital gain thereon. The calculation of the marginal rate of return was based on the assumption that income from dwellings in year $t(Y_t)$ is equal to the product of total capital (K_t) invested in dwellings up to that year by the marginal rate of return on dwellings (τ),

$$\tau=\frac{Y_t}{K_t}=\frac{\Delta Y_t}{\Delta K_t}=\frac{\Delta Y_t}{I_t} \tag{A1}$$

Formula (A1) may be slightly modified if we postulate that it takes about three years to construct a dwelling. In this case, we have:

$$\tau=\frac{3\Delta Y_t}{I_t+I_{t-1}+I_{t-2}} \tag{A2}$$

Data for income from dwellings and gross investments in dwellings (at constant 1970 prices) were obtained from National Accounts of Greece.

Capital gain cannot be estimated directly since no price index for a given sample of dwellings has ever been constructed. Instead, the annual rate of change of the average value of dwellings serves as a proxy for capital gain; the average value corresponds to the ratio of gross investments in dwellings at current prices to gross investments in dwellings at constant (1970) prices.

8) *Price level of agricultural products*: Agricultural product price deflator (ratio of gross product in agriculture at current prices to the corresponding gross product at constant 1970 prices) from National Accounts of Greece.

9) *Price level for imported items*: Index of unit value of imports from Monthly Statistical Bulletins of Foreign Trade, National Statistical Service of Greece.

10) *Wage rate*: Weekly receipts of workers in industry (quarterly figures are averaged to obtain annual data), from Monthly Bulletins, National Statistical Service of Greece.

11) *Profits*: Ratio of net profits to total capital assets of corporations from "Greek Industry" Annual Bulletins, Confederation of Greek Manufactures).

12) *Indirect taxes*: Ratio of real (i.e. at constant prices) net indirect taxes to real net consumption expenditure not including real net indirect taxes. Source: National Accounts of Greece.

13) *Money supply*: Currency in circulation plus sight deposits (M1) at the end of each year. Source: Monthly Statistical Bulletins of the Bank of Greece.

14) *National income*: Gross national product from National Accounts of Greece.

15) *Unemployment*: Number of unemployed in industry (craftsmen, production-process workers, mechanical-transport means operators) from Monthly Bulletins of the National Statistical Service of Greece. Quarterly figures—that is, the median of quarterly data—are averaged to obtain annual data.

16) *Working hours per week*: Hours of weekly work in industry from Monthly Bulletins of the National Statistical Service of Greece. Quarterly figures are averaged to obtain annual data.

17) *Labour productivity*: The ratio of the manufacturing production index to the employment index (of salaried employees and wage earners in industry and handicraft) multiplied by the manufacturing price deflator. Source: National Accounts and Monthly Bulletins of the National Statistical Service of Greece.

University of Athens

REFERENCES

[1] Ando, A. and F. Modigliani, F. (1963), The Life-Cycle Hypothesis of Saving, Aggregate Implications and Tests, American Economic Review, 53.

[2] Balopoulos, E. (1967), Fiscal Policy Models in the British Economy, North Holland Pub. Co., Amsterdam.

[3] Boskin, M. (1978), Taxation, Saving and the Rate of Interest, Journal of Political Economy, 86, April.

[4] Brechling, F. P. R. (1972), in J. M. Parkin and M. T. Summer (eds.), Some Empirical Evidence on the Effectiveness of Prices and Income Policies.

[5] Brumberg, R. (1956), An approximation to the Aggregate Saving Function, The Economic Journal, 66, March.

[6] Central Planning Bureau, Netherlands (1970), Central Economic Plan, The Hague, Staatsuitgaverij.

[7] Christ, C. (1963), Interest Rates and Portfolio Selection Among Liquid Assets in the U.S., Stanford University Press.

[8] Deaton, A. (1977), Involuntary Saving Through Unanticipated Inflation, American Economic Review, 67, October.

[9] Deaton, A. and J. Muellbauer (1980), Economics and Consumer Behavior, Cambridge University Press, Cambridge.

[10] Dernburg, T. and D. Mc Dougall (1976), Macroeconomics, Mc Graw Hill Book Co., N. Y., p. 74.

[11] Diz, A. C. (1970), Money and Prices in Argentina, 1935–1962, in Varieties of Monetary Experience, D. Meiselman (ed), University of Chicago Press.

[12] Feldstein, M. (1973), Tax Incentives, Corporate Saving and Capital Accumulation in the U.S., Journal of Public Economics, 2, February.

[13] Friedman, M. (1957), A Theory of the Consumption Function, Princeton: Princeton University Press.

[14] Friedman, M. (1969), Monetary Theory and Policy, in R. J. Ball and Doyle (eds), Inflation, Penguin, Baltimore.

[15] Friedman, M. (ed) (1956), Studies in the Quantity Theory of Money, University of Chicago Press, Chicago, Ill.

[16] Goldberger, A. (1970), Impact multipliers and Dynamic Properties of the Klein-Goldberger

Model, North Holland Pub. Co., Amsterdam.

[17] Hamburger, W. (1955), The Relation of Consumption to Wealth and the Wage Rate, Econometrica, Vol. 23.

[18] Hilton, K. and D. Crossfield (1970), Short-Run Consumption Functions for the U.K. 1955–1966, The Econometric Study of the U.K., Mc Millan and Co., London.

[19] Houthakker, H. and L. Taylor (1970), Consumer Demand in the U.S.: Analyses and Projections, Harvard Economic Studies.

[20] Juster, F. T. and Lester D. Taylor (1975), Towards a Theory of Saving Behavior, American Economic Review, 65, May.

[21] Juster, F. T. and P. Wachtel (1972), Inflation and the Consumer, Brookings Papers on Economic Activity, No 1.

[22] Juster, F. T. and P. Wachtel (1972), A Note on Inflation and the Savings Rate, Brookings Papers on Economic Activity, No 3, Brookings Institution, Washington D.C.

[23] Keynes, J. (1936), The General Theory of Employment, Interest and Money, N. Y.: Harcourt, Brace and World.

[24] Klein, L. R. (1950), Economic Fluctuations in the U.S. 1921–1941, Wiley, N. Y.

[25] Klein, L. R. (1951), Estimating Patterns of Savings Behaviour from Sample Survey Data, Econometrica (Vol. 19).

[26] Klein, L. R. (1958), The Friedman-Becker Illusion, Journal of Political Economy, Vol. 66.

[27] Klein, L. R. and A. Goldberger (1955), An Econometric Model of the U.S., 1929–1952, North Holland Pub. Co., Amsterdam.

[28] Lubell, H. (1947), Effects of Income Redistribution on Consumers' Expenditures, American Economic Review, Vol. 37.

[29] Mac Callum, B. T. (1970), The Effects of Demand on Prices in British Manufacturing, Review of Economic Studies, Vol. 37(1).

[30] Miller, E. (1984), Bank Deposits in the Monetary Theory of Keynes, Journal of Money, Credit and Banking, Vol. 16, No 2, May.

[31] Modigliani, F. and R. Brumberg (1955), Utility Analysis and the Consumption Function: An Interpretation of the Cross-Section Data, in Post-Keynesian Economics, edited by K. Kurihara, London: George Allen and Unwin.

[32] Modigliani, F. and E. Tarantelli (1973), A Generalization of the Phillips Curve to a Developing Economy, Review of Economic Studies, pp. 203–223.

[33] Musgrave, R. (1959), The Theory of Public Finance, McGraw Hill Book Co., Inc., N. Y.

[34] Niskanen, W. (1978), Deficits, Government Spending and Inflation, Journal of Monetary Economics, 4, pp. 591–602.

[35] Peek, J. (1983), Capital Gains and Personal Saving Behavior, Journal of Money, Credit and Banking, Vol. 15, No 1, February.

[36] Poole, W. (1982), The Role of Interest Rates and Inflation in the Consumption Function, Brookings Papers on Economic Activity, No 1.

[37] Samuelson, P. (1948), Foundations of Economic Analysis, Cambridge: Harvard University Press.

[38] Somermeyer, W. and R. Bannink (1973), A Consumption-Savings Model and its Applications, North Holland Pub. Co., Amsterdam.

[39] Solow, R. M. (1969), Price Expectations and the Behaviour of the Price level, Manchester University Press.

[40] Surrey, M. (1970), Personal Income and Consumer's Expenditure, in the Econometric Study of the U.K., Mc Millan and Co., London.

[41] Tobin, J. (1951), Relative Income, Absolute Income and Saving, in Money, Trade and Economic Growth, Essays in Honour of J. H. Williams, N. Y.

[42] Townend, J. C. (1976), The Personal Saving Ratio, Bank of England Quarterly Bulletin, 16.

[43] Wachtel, P. (1977), Inflation, Uncertainty and Saving Behavior since the Mid-1950's, Explorations in Economic Research, 4.